ner. Our San Joaquin Valley station, near Tulare, has suffered almost a total loss of its fruit crop, and even barley has been frosted so badly that it will make no grain, but had to be cut for hay. It is thus evident that the observations of extremes, as well as of means, should be most carefully made and faithfully kept; to insure this our stations should be equipped with self-recording instruments.

TOTAL SNOWFALL FOR THE WINTER 1895-96.

In the REVIEW and SUMMARY for 1895, Vol. XXIII, pp. 491 and 500, the Editor has given the annual snowfall for the so-called snow year, July to June, inclusive, for the ten years 1884–95. The following table gives the corresponding data for 1895–96. In a few cases, where records have been interrupted by discontinuance of stations, the values given by voluntary reporters have been used to complete an annual total. These snowfalls are also reproduced in Chart VII, but lines of equal snowfall are not drawn as the great distance of the stations apart and their diverse locations forbid reliance upon any system of interpolated lines.

Total snowfall at Weather Bureau stations.

(The snowfall is given for the so-called snow year, viz, from July 1, 1895, to June 30, 1896, inclusive.)

Station.	Inches.	Station.	Inches.
Alabama.		*Minnesota.*	
Mobile	T.	Duluth	40.4
Montgomery	T.	Minneapolis	27.0
Arizona.		Moorhead	43.0
Tucson	0.0	St. Paul	41.5
Yuma	0.0	St. Vincent	52.0?
Arkansas.		*Mississippi.*	
Fort Smith	5.0	Meridian	T.
Little Rock	3.1	Vicksburg	0.0
California.		*Missouri.*	
Independence	0.0	Columbia	27.7
Red Bluff	1.0	Hannibal	21.4
Sacramento	0.0	Kansas City	29.3
San Francisco	0.5	St. Louis	17.2
Colorado.		Springfield	25.7
Colorado Springs	41.2	*Montana.*	
Denver	58.3	Havre	38.5
Montrose	36.3?	Helena	58.2
Pueblo	18.8	Miles City	23.3
Connecticut.		*Nebraska.*	
New Haven	35.1	North Platte	20.8
New London	37.6	Omaha	30.8
District of Columbia.		Valentine	36.9
Washington	9.3	*Nevada.*	
Florida.		Carson City	27.3
Jacksonville	0.0	Winnemucca	41.1
Pensacola	0.0	*New Jersey.*	
Tampa	0.0	New Brunswick	5.8
Georgia.		*New Mexico.*	
Atlanta	0.2	Santa Fe	45.4
Augusta	T.	*New York.*	
Savannah	T.	Albany	51.6
Idaho.		Buffalo	72.0
Idaho Falls	53.7	New York	42.0
Illinois.		Oswego	74.9
Cairo	13.9	Rochester	93.8
Chicago	56.6	*North Carolina.*	
Springfield	16.3	Charlotte	1.1
Indiana.		Hatteras	T.
Indianapolis	46.8	Kittyhawk	5.0
Iowa.		Raleigh	1.2
Davenport	22.8	Wilmington	12.1
Des Moines	26.5	*North Dakota.*	
Dubuque	33.7	Bismarck	37.0
Keokuk	21.2	Williston	54.7
Sioux City	15.1	*Ohio.*	
Kansas.		Cincinnati	29.3
Concordia	15.7	Cleveland	48.2
Dodge City	5.3	Columbus	27.4
Topeka	11.4	Sandusky	25.2
Wichita	10.7	Toledo	63.7
Kentucky.		*Oklahoma.*	
Lexington	28.1	Oklahoma	5.7
Louisville	32.0	*Oregon.*	
Louisiana.		Astoria	6.0
New Orleans	0.0	Baker City	33.2
Shreveport	T.	Portland	9.1
Maine.		Roseburg	16.7
Eastport	57.5	*Pennsylvania.*	
Portland	77.1	Erie	71.8
Maryland.		Harrisburg	32.7
Baltimore	17.0	Philadelphia	14.8
Massachusetts.		Pittsburg	23.3
Boston	38.2	*Rhode Island.*	
Nantucket	32.0	Block Island	36.4
Vineyard Haven	27.8	Narragansett Pier	29.5
Woods Hole	33.9	*South Carolina.*	
Michigan.		Charleston	T.
Alpena	53.7	Columbia	0.6
Cheboygan	99.8	*South Dakota.*	
Detroit	54.3	Huron	20.1
Grand Haven	58.8	Pierre	27.3
Marquette	105.8	Rapid City	40.3
Port Huron	29.2	*Tennessee.*	
Sault Ste. Marie	110.7	Chattanooga	1.9

Total snowfall—Continued.

Station.	Inches.	Station.	Inches.
Tennessee—Continued.		*Washington*	
Knoxville	3.5	East Clallam	37.0
Memphis	8.6	Fort Canby	5.3
Nashville	5.0	Neah Bay	20.0
Texas.		Olympia	3.0
Abilene	4.0	Port Angeles	18.0
Amarillo	12.8	Port Crescent	24.8
Corpus Christi	0.0	Pysht	25.0
El Paso	0.4	Seattle	10.4
Galveston	0.0	Spokane	46.6
Palestine	T.	Tatoosh Island	7.9
San Antonio	0.0	Walla Walla	17.0
Utah.		*West Virginia.*	
Salt Lake City	40.2	Parkersburg	32.9
Vermont.		*Wisconsin.*	
Northfield	89.8	Green Bay	32.5
Virginia.		La Crosse	36.4
Cape Henry	3.6	Milwaukee	51.4
Lynchburg	11.5	*Wyoming.*	
Norfolk	5.7	Cheyenne	50.3
		Lander	64.6

RÖNTGEN RAYS AND CLOUDY CONDENSATION.

Although meteorologists have not yet ascertained the exact process by which rain drops are made by Nature in her atmospheric laboratory, yet much light has been thrown upon the formation of the little globules of water that make up the ordinary mist and cloud. Among those who have worked upon the subject of the cloudy condensation of atmospheric moisture the most prominent names are: Coulier, of France, John Aitken, of Scotland, Robert, the son of Hermann von Helmholtz, and also Kiessling, both of Germany, and Carl Barus, formerly of the Weather Bureau, Washington. These physicists have shown that when moist air is cooled nearly to the dew-point the aqueous vapor begins to condense by preference upon the minute solid particles which we call dust floating in the atmosphere, no matter what the chemical nature of these particles may be; over the ocean the nuclei are mostly minute crystals of salt; in tropical lands and hot countries they are the spores and cells of debris of cells of vegetable origin; in the smoky atmosphere of large cities, the minute particles of carbon that go to form soot constitute the nuclei. It has not yet been clearly ascertained how the moist air would give up its moisture if there were absolutely no nuclei on which to initiate the condensation. Some consideration of this subject has been indulged in by Von Bezold and slightly modified by the present writer (see "The Production of Rain," in Frear's Monthly Journal Agricultural Science, 1892, Vol. VI, pp. 297–309) to the effect that in the ascending portions of every cloud there are regions that are supersaturated with moisture and that a strained molecular condition is thus produced that eventually and suddenly gives way accompanied by the production of the large drops of rain and electric phenomena. These views on the formation of cloud in the absence of dust were (probably quite independently) investigated by Mr. C. T. R. Wilson, according to an abstract published in Nature, Vol. LII, p. 144, of the paper read by him on May 13, 1895, before the Philosophical Society of Cambridge, England. Wilson found (as, indeed, Espy had done before him, see Espy's Philosophy of Storms, p. 35–36) that—

If ordinary air is started with, it is found that after a comparatively small number of expansions (due to the removal of the dust particles by the condensation that takes place on them) there is no further condensation unless the expansion exceeds a certain definite amount. With expansion greater than this critical value condensation again invariably takes place, and the critical value shows no tendency to rise, no matter however many expansions be made. The latest result for the ratio of the final to the initial volume, when the critical expansion is just reached is 1.258 (when initial temperature is 16.7° C. = 62.06° F.). This corresponds to a fall of temperature of 26° C. (46.8° F.) and a vapor pressure 4.5 times the saturation pressure for a plane surface of water. The radius of a water drop just in equilibrium with this degree of supersaturation is 0.0000065 cm. = 0.00000256 inch,